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Patent
62478-4400

IN THE CLAIMS:

1. - 4. (Cancelled)

5. (Previously Presented) The program information transmission apparatus of Claim 26,
wherein each program information set is assigned a priority, and
the packet fetching unit fetches the plurality of packets from the queues according to the priorities assigned to the program information sets.

6. (Original) The program information transmission apparatus of Claim 5,
wherein the storing unit also stores each maximum number calculated by the first calculation unit, and

the packet fetching unit includes:

a cumulative calculation unit operable to, after the packet fetching unit fetches the last packet of a current section in an "n"th transmission period, calculate a cumulative number for a program information set including the current section by multiplying the maximum number for the program information set by "n", each transmission period being a period within the cycle and having a length of the unit time, the cumulative number being a number of packets of the program information set that should be transmitted by an end of the "n"th transmission period; and

a selecting unit operable to, if a number of hitherto fetched packets of the program information set is at least equal to the cumulative number, select another program information set assigned a next higher priority as a program information set whose packets are to be fetched.

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7. (Cancelled)

8. (Previously Presented) The program information transmission apparatus of Claim 27,

wherein the prohibiting unit waits for all packets of a section, which includes a packet fetched immediately before the immediate program information was inputted, to be fetched before starting the prohibition operation.

9. (Cancelled)

10. (Previously Presented) The program information transmission apparatus of Claim 28,

wherein the prohibiting unit waits for all packets of a section, which includes a packet fetched immediately before the immediate program information was inputted, to be fetched before starting the prohibition operation, and

the prohibition ending unit waits for a number of packets, whose transmission is refrained after all packets generated by the second packet generating unit are transmitted, reaches a number of transmitted packets exceeding the maximum number of packets that should be transmitted per unit time, before instructing the prohibiting unit to end the prohibition operation.

11. (Original) A program information transmission apparatus that repeatedly transmits program information with a predetermined cycle, comprising:

a storing unit operable to store information showing a maximum number for each transmission period that is a period within the cycle and has a length of a unit time shorter than

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the cycle, each maximum number for one transmission period being a number of packets that should be transmitted in the transmission period;

a packet generating unit operable to generate a plurality of packets of a fixed length from program information sets, each of which includes a part of the program information;

a holding unit operable to hold the plurality of packets so that packets belonging to different program information sets are held in different queues;

a fetching unit operable to fetch the plurality of packets from the queues in a predetermined order so that a number of packets fetched in each transmission period does not exceed the maximum number for the transmission period;

a transmission unit operable to sequentially transmit each fetched packet;

a calculation unit operable to recalculate each maximum number, each time at least one program information set is updated or is newly registered,

wherein the calculation unit includes:

a first calculation unit operable to divide a data amount of each program information set by a number of transmission periods within the cycle and set a division result obtained for each program information set as an average number for the program information set without rounding up or discarding a fractional portion of the division result, each average number for one program information set being a number of packets of the program information set that should be transmitted per unit time;

a second calculation unit operable to calculate, for each program information set, a cumulative number of packets of the program information set that should be transmitted by an end of an "n"-th transmission period by multiplying the average number for the program information set by "n";

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a third calculation unit operable to total the cumulative numbers calculated by the second calculation unit; and

a fourth calculation unit operable to calculate the maximum number for the "n"th transmission period from the total calculated by the third calculation unit,

wherein the information in the storing unit is overwritten with the maximum number calculated by the fourth calculation unit.

12. (Original) The program information transmission apparatus of Claim 11,

wherein the second calculation unit adds a predetermined positive value that does not exceed one to each average number, sets each addition result as a new average number, multiplies each new average number by "n", obtains an integer by rounding up each multiplication result, and sets each integer as one cumulative number.

13. (Original) The program information transmission apparatus of Claim 11,

wherein packets generated from one program information set is divided into at least one section, and

the packet fetching unit is controlled to fetch all packets in a current section before fetching packets in another section.

14. (Original) The program information transmission apparatus of Claim 11,

wherein each program information set is assigned a priority, and

the packet fetching unit fetches the plurality of packets from the queues according to the priorities assigned to the program information sets.

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15. (Original) The program information transmission apparatus of Claim 14,
wherein the storing unit also stores each cumulative number calculated by the
second calculation unit, and

after fetching the last packet of a current section in the "n"th transmission period,
the packet fetching unit refers to the information in the storing unit and, if a number of hitherto
fetched packets of a program information set including the current section is at least equal to the
cumulative number for the program information set, selects another program information set
assigned a next higher priority as a program information set whose packets are to be fetched.

16. (Original) The program information transmission apparatus of Claim 11 further
comprising:

an input receiving unit operable to receive an input of immediate program
information that should be urgently transmitted;

a prohibiting unit operable to prohibit, if immediate program information is
inputted, the packet fetching unit from fetching packets;

a second packet generating unit operable to generate a plurality of packets of a
fixed length from the inputted immediate program information;

a transmission control unit operable to control the transmission unit to
sequentially transmit all of the packets generated by the second packet generating unit; and

a prohibition ending unit operable to instruct, after all of the packets generated by
the second packet generating unit are transmitted, the prohibiting unit -to end the prohibition
operation.

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17. (Original) The program information transmission apparatus of Claim 16,
wherein the prohibiting unit waits for all packets of a section, which includes a
packet fetched immediately before the immediate program information was inputted, to be
fetched before starting the prohibition operation.

18. (Original) The program information transmission apparatus of Claim 11 further
comprising:

an input receiving unit operable to receive an input of immediate program
information that should be urgently transmitted;

a prohibiting unit operable to prohibit, if immediate program information is
inputted, the packet fetching unit from fetching packets;

a second packet generating unit operable to generate a plurality of packets of a
fixed length from the inputted immediate program information;

a transmission control unit operable to control the transmission unit to
sequentially transmit all of the packets generated by the second packet generating unit; and

a prohibition ending unit operable to perform, after all of the packets generated by
the second packet generating unit are transmitted, packet transmission adjustment for a number
of transmitted packets exceeding the maximum number for the "n"th transmission period, before
instructing the prohibiting unit to end the prohibition operation.

19. (Original) The program information transmission apparatus of Claim 18,
wherein the prohibiting unit waits for all packets of a section, which includes a
packet fetched immediately before the immediate program information was inputted, to be
fetched before starting the prohibition operation, and

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the prohibition ending unit waits for a number of packets, whose transmission is refrained after all packets generated by the second packet generating unit are transmitted, reaches a number of transmitted packets exceeding the maximum number for the "n"th transmission period, before instructing the prohibiting unit to end the prohibition operation.

20.-25. (Cancelled)

26. (Previously Presented) A program information transmission apparatus that repeatedly transmits program information with a predetermined cycle, comprising:

a storing unit operable to store information showing a transmission amount per unit time, the unit time being shorter than the cycle;

a fetching unit operable to fetch the program information in parts so that each fetched part of the program information has a size within the transmission amount per unit time; and

a transmission unit operable to sequentially transmit each fetched part of the program information,

wherein the information in the storing unit shows, as the transmission amount per unit time, a maximum number of packets that should be transmitted per unit time,

the fetching unit includes:

a packet generating unit operable to generate a plurality of packets of a fixed length from program information sets, each of which includes a part of the program information;

a holding unit operable to hold the plurality of packets so that packets belonging to different program information sets are held in different queues; and

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a packet fetching unit operable to fetch the plurality of packets from the queues in a predetermined order so that a number of packets fetched per unit time does not exceed the maximum number,

packets generated from one program information set is divided into at least one section, and

the packet fetching unit is controlled to fetch all packets in a current section before fetching packets in another section,

the program information transmission apparatus further comprising:

a calculation unit operable to recalculate the maximum number, each time at least one program information set is updated or is newly registered,

wherein the calculation unit includes:

a first calculation unit operable to calculate a maximum number for each program information set from a data amount of the program information set and the cycle, each maximum number calculated for one program information set being a maximum number of packets of the program information set that should be transmitted per unit time; and

a second calculation unit operable to calculate a total of the maximum numbers calculated by the first calculation unit, and

the information in the storing unit is overwritten with the total calculated by the second calculation unit.

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27. (Previously Presented) A program information transmission apparatus that repeatedly transmits program information with a predetermined cycle, comprising:

a storing unit operable to store information showing a transmission amount per unit time, the unit time being shorter than the cycle;

a fetching unit operable to fetch the program information in parts so that each fetched part of the program information has a size within the transmission amount per unit time;
and

a transmission unit operable to sequentially transmit each fetched part of the program information,

wherein the information in the storing unit shows, as the transmission amount per unit time, a maximum number of packets that should be transmitted per unit time,

the fetching unit includes:

a packet generating unit operable to generate a plurality of packets of a fixed length from program information sets, each of which includes a part of the program information;

a holding unit operable to hold the plurality of packets so that packets belonging to different program information sets are held in different queues; and

a packet fetching unit operable to fetch the plurality of packets from the queues in a predetermined order so that a number of packets fetched per unit time does not exceed the maximum number,

packets generated from one program information set is divided into at least one section, and

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the packet fetching unit is controlled to fetch all packets in a current section before fetching packets in another section, and

the program information transmission apparatus further comprising:

an input receiving unit operable to receive an input of immediate program information that should be urgently transmitted;

a prohibiting unit operable to prohibit, if immediate program information is inputted, the packet fetching unit from fetching packets;

a second packet generating unit operable to generate a plurality of packets of a fixed length from the inputted immediate program information;

a transmission control unit operable to control the transmission unit to sequentially transmit all of the packets generated by the second packet generating unit; and

a prohibition ending unit operable to instruct, after all of the packets generated by the second packet generating unit are transmitted, the prohibiting unit to end the prohibition operation.

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28. (Previously Presented) A program information transmission apparatus that repeatedly transmits program information with a predetermined cycle, comprising:

a storing unit operable to store information showing a transmission amount per unit time; the unit time being shorter than the cycle;

a fetching unit operable to fetch the program information in parts so that each fetched part of the program information has a size within the transmission amount per unit time; and

a transmission unit operable to sequentially transmit each fetched part of the program information,

wherein the information in the storing unit shows, as the transmission amount per unit time, a maximum number of packets that should be transmitted per unit time, and

the fetching unit includes:

a packet generating unit operable to generate a plurality of packets of a fixed length from program information sets, each of which includes a part of the program information;

a holding unit operable to hold the plurality of packets so that packets belonging to different program information sets are held in different queues; and

a packet fetching unit operable to fetch the plurality of packets from the queues in a predetermined order so that a number of packets fetched per unit time does not exceed the maximum number, and

the program information transmission apparatus further comprising:

an input receiving unit operable to receive an input of immediate program information that should be urgently transmitted;

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a prohibiting unit operable to prohibit, if immediate program information is inputted, the packet fetching unit from fetching packets;

a second packet generating unit operable to generate a plurality of packets of a fixed length from the inputted immediate program information;

a transmission control unit operable to control the transmission unit to sequentially transmit all of the packets generated by the second packet generating unit; and

a prohibition ending unit operable to perform, after all of the packets generated by the second packet generating unit are transmitted, packet transmission adjustment for a number of transmitted packets exceeding the maximum number of packets that should be transmitted per unit time, before instructing the prohibiting unit to end the prohibition operation.

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29. (Currently Amended) A program information transmission method of repeatedly transmitting program information with a predetermined cycle, comprising:

a packet generating step for generating a plurality of packets of a fixed length from program information sets, each of which includes a part of the program information;

a holding step for holding the plurality of packets so that packets belonging to different program information sets are held in different queues;

a packet fetching step for fetching, in each transmission period that is a period within the cycle and has a length of a unit time shorter than the cycle, the plurality of packets from the queues in a predetermined order so that a number of packets fetched in each transmission period does not exceed a maximum number of packets that should be transmitted in the transmission period; and

a transmission step for sequentially transmitting each fetched packet,

wherein packets generated from one program information set is divided into at least one section,

the packet fetching step is controlled to fetch all packets in a current section before fetching packets in another section,

each program information set is assigned a priority, the packet fetching step fetches the plurality of packets from the queues according to the priorities assigned to the program information sets, and

the packet fetching step includes:

a cumulative calculation step for calculating, after the packet fetching step fetches the last packet of a current section in an "n"th transmission period, a cumulative number for a

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program information set including the current section by multiplying "n" by a predetermined maximum number of packets of the program information set that should be transmitted per unit time, the cumulative number being a number of packets of the program information set that should be transmitted by an end of the "n"th transmission period:

a calculation step for recalculating each maximum number, each time at least one program information set is updated or is newly registered,

wherein the calculation step includes:

a first calculation step for dividing a data amount of each program information set by a number of transmission periods within the cycle and set a division result obtained for each program information set as an average number for the program information set without rounding up or discarding a fractional portion of the division result, each average number for one program information set being a number of packets of the program information set that should be transmitted per unit time;

a second calculation step for calculating, for each program information set, a cumulative number of packets of the program information set that should be transmitted by an end of an "n"th transmission period by multiplying the average number for the program information set by "n";

a third calculation step for totaling the cumulative numbers calculated in the second calculation step; and

a fourth calculation step for calculating the maximum number for the "n"th transmission period from the total calculated in the third calculation step, and

the information in the storing step is overwritten with the maximum number calculated in the fourth calculation step.

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30. (New) A method of repeatedly transmitting program information with a predetermined cycle, comprising the steps of:

storing information showing a maximum number for each transmission period that is a period within the cycle and has a length of a unit time shorter than the cycle, each maximum number for one transmission period being a number of packets that should be transmitted in the transmission period;

generating a plurality of packets of a fixed length from program information sets, each of which includes a part of the program information;

holding the plurality of packets so that packets belonging to different program information sets are held in different queues;

fetching the plurality of packets from the queues in a predetermined order so that a number of packets fetched in each transmission period does not exceed the maximum number for the transmission period;

sequentially transmitting each fetched packet; and

recalculating each maximum number, each time at least one program information set is updated or is newly registered,

wherein the recalculating steps includes:

dividing a data amount of each program information set by a number of transmission periods within the cycle and setting a division result obtained for each program information set as an average number for the program information set without rounding up or discarding a fractional portion of the division result, each average number for one program information set being a number of packets of the program information set that should be transmitted per unit time;

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recalculating, for each program information set, a cumulative number of packets of the program information set that should be transmitted by an end of an "n"th transmission period by multiplying the average number for the program information set by "n";

totaling the cumulative numbers recalculated; and

calculating the maximum number for the "n"th transmission period from the total cumulative number calculated,

wherein the information stored is overwritten with the maximum number calculated for the "n"th transmission period.

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